

REMARKS

This application has been carefully reviewed in light of the Office Action dated December 12, 2002 (Paper No. 8). Claims 1 to 20, 24 and 32 to 81 are in the application, with Claims 21 to 23 and 25 to 31 having been cancelled and Claims 72 to 81 having been newly added herein. Claims 1, 24, 32, 35, 38, 54, 74 and 75 are the independent claims. Reconsideration and further examination are respectfully requested.

Initially, Applicant thanks the Examiner for the indication that Claims 1 to 15, 17, 18, 25 and 35 to 37 have been allowed. While Claims 1 and 2 have been amended, none of the changes made to these claims are believed to effect their allowability.

Applicant also thanks the Examiner for the indication that Claims 16, 19, 20, 29, 32, 33, 34, 49, 65, 70 and 71 contain allowable subject matter and would be allowable once the 35 U.S.C. § 112, second paragraph, rejection discussed below is overcome and if rewritten in independent form, and that Claims 50, 51, 66 and 67 also contain allowable subject matter and would be allowable if rewritten in independent form. With the exception of Claim 32, which is an independent claim, these claims have not been written in independent form since it is believed that all claims currently pending in the application are in condition for allowance, as discussed in more detail below.

Claims 1, 2, 19, 24, 32, 33, 35, 36, 45, 52 and 68 were objected to for informalities. In response, Applicant has amended these claims to address the informalities identified in the Office Action.

Claims 21 to 24 and 26 to 31 were objected to under 37 C.F.R. § 1.75 for allegedly being substantial duplicates of Claims 7, 19/7, 20/7, 8, 9, 19/8, 20/8, 16, 19/16

and 20/16, respectively. Applicant has cancelled Claims 21 to 23 and 25 to 31 without prejudice or disclaimer of the subject matter contained therein. Claim 24 has been amended to include the allowed subject matter of Claim 25, and is therefore believed to be in condition for allowance.

Claims 16, 32, 49 and 65 were rejected under 35 U.S.C. § 112, second paragraph, for alleged indefiniteness. Specifically, the Office Action contended that the use of the term "and/or" in these claims does not clearly set forth the metes and bounds of the patent protection desired. While Applicant does not agree that the use of the term "and/or" renders these claims indefinite, in an effort to advance prosecution in the application Applicant has amended these claims to remove the term in question. In addition, Applicant has added new Claims 72 to 75 and 78 to 81 to included the desired combinations set forth in the rejected claims. In view of the indication that Claims 16, 32, 49 and 65 contain allowable subject matter, these claims as well as new Claims 72 to 75 and 78 to 81 are believed to be in condition for allowance.

Claims 38 to 45, 52 to 61, 68 and 69 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 4,634,232 (Tateoka) in view of U.S. Patent No. 6,134,040 (Rim); and Claims 46 to 48, 52, 53, 62 to 64, 68 and 69 were rejected under § 103(a) over Tateoka in view of Rim and further in view of EP 0 804 015 (Ando). Applicant has considered the Examiner's comments together with the applied references and respectfully submits that the rejected claims are patentably distinguishable over the applied references for at least the following reasons.

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Independent Claim 38 concerns a multi-beam scanning optical apparatus that includes an incident optical system for making a plurality of light beams emitted from a light source having a plurality of light emitting portions incident on a deflector. A scanning optical system forms images with the plurality of light beams deflected by the deflector on a surface to be scanned. The scanning optical system includes a plurality of scanning optical elements each made of a resin. An interval error between scanning lines in a sub-scanning line direction is set to be not more than  $1/5$  of a desired scanning line interval, where the interval error is caused by a relation in which polarized light beams of the plurality of light beams emitted from the plurality of light emitting portions are not parallel or orthogonal with each other.

Independent Claim 54 concerns a multi-beam scanning optical apparatus that includes an incident optical system for making a plurality of light beams emitted from a light source having a plurality of light emitting portions incident on a deflector. A scanning optical system forms images with the plurality of light beams deflected by the deflector on a surface to be scanned. The scanning optical system includes refractive optical elements which are scanning optical elements made of a resin. An interval error between scanning lines in a sub-scanning line direction is set to be not more than  $1/5$  of a desired scanning line interval, where the interval error is caused by a relation in which polarized light beams of the light beams emitted from the plurality of light emitting portions are not parallel or orthogonal with each other.

As described above, the present invention concerns intervals between scanning lines formed by multiple light beams in a multi-beam scanning optical apparatus.

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When polarized light beams used in the apparatus are not parallel or orthogonal with each other, interval errors between scanning lines in a sub-scanning line direction can result. The present invention reduces the effect of these interval errors by setting an interval error between scanning lines to be not more than  $1/5$  of a desired scanning line interval.

The applied references are not seen to disclose or suggest the foregoing features of the present invention. In particular, the applied references are not seen to disclose or suggest at least the feature of setting an interval error between scanning lines in a sub-scanning line direction to be not more than  $1/5$  of a desired scanning line interval, where the interval error is caused by a relation where polarized light beams are not parallel or orthogonal with each other.

Tateoka concerns a light source device for synthesizing a light beam from two semiconductor lasers. As shown in Figure 1 of Tateoka, a polarizing beam splitter that includes an interference film is used to synthesize light beams emitted from two different lasers. The interference film described in Tateoka transmits light polarized in a first plane, but reflects light polarized in a second plane perpendicular to the first plane. Tateoka utilizes a half-waveplate to rotate the plane of polarization for one of the lasers to be orthogonal to that of the other laser, thereby causing the light beam from the one laser to be reflected rather than transmitted by the interference film.

The Office Action has contended that the half-waveplate in Tateoka is used to set a sub-scanning interval error between scanning lines due to a polarization angle difference to be not more than  $1/5$  of a desired scanning line interval. Applicant respectfully disagrees with this interpretation of Tateoka. The half-waveplate in Tateoka is

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seen to rotate the polarization of a light beam, however, this rotation of the polarization is not seen to set an interval error between scanning lines in a sub-scanning direction to be not more than  $1/5$  of a desired scanning line interval. Furthermore, since the two light beams synthesized in Tateoka are seen to be orthogonal, with one being transmitted by the interference film and the other being reflected, Tateoka is not seen involve the situation where polarized light beams are not parallel or orthogonal with each other. Therefore, Tateoka is not seen to set an interval error between scanning lines in a sub-scanning direction where the interval error is caused by a relation in which polarized light beams are not parallel or orthogonal with each other.

Rim and Ando are not seen to disclose or suggest anything to remedy the foregoing deficiencies of Tateoka. Rim concerns a laser scanning system and was applied in the Office Action for its disclosure of the use of optical lenses made of a plastic substance. Ando concerns an optical scanning device and was applied in the Office Action for its disclosure of monolithic multi-beam light sources. Neither of these references, either alone or in combination with Tateoka, is seen to disclose or suggest at least the feature of setting an interval error between scanning lines in a sub-scanning line direction to be not more than  $1/5$  of a desired scanning line interval, where the interval error is caused by a relation where polarized light beams are not parallel or orthogonal with each other.

Accordingly, independent Claims 38 and 54 are believed to be allowable over the applied references. Reconsideration and withdrawal of the § 103(a) rejection of Claims 38 and 54 are respectfully requested.

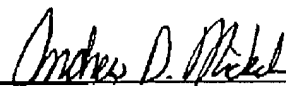
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The other claims in the application are dependent from the independent claims discussed above and are therefore believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing amendment and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, California, office by telephone at (714) 540-8700. All correspondence should be directed to our address given below.

Respectfully submitted,



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